

(Once complete, this will be inserted into Chapter 8 of the Climate Action Team Report)

8 MACROECONOMIC ASSESSMENT

This section discusses the results from a preliminary assessment of the macroeconomic impacts associated with the climate change emission reduction strategies presented in Table 5-2. Prior to the January 23rd and 24th Climate Action Team public meetings, the macroeconomic analysis will be updated to include climate change emission reduction strategies presented in Table 5-1.

The results show that the overall impacts of the climate change reduction strategies are expected to be positive. Specifically, when the strategies being proposed are considered in total, the resulting impacts on the economy are expected to translate into job and income gains for Californians over the next ten to twenty years.

These favorable impacts on the economy are possible because of reduced operating costs associated with many of the strategies. The additional job growth is expected to come from a net savings to consumers associated with the implementation of the strategies. Specifically, the savings that consumers will enjoy result from reduced operating costs. The savings will in turn promote further business expansion and job creation. These impacts are discussed later in the section.

The results presented in this section are considered preliminary because the cost and potential savings information associated with most of the individual strategies have not yet been fully developed. Further, as stated above, only strategies in Table 5-2 have been included. Strategies in Table 5-1 will be included prior to the January 23rd and 24th workshops and are anticipated to provide further increases in jobs and improve the economy of the state.

The remainder of this section discusses the model of the California economy used for the assessment, the analysis of the strategies in Table 5-2, a discussion and interpretation of the results, as well as a summary.

8.1 Economic Model

This macroeconomic assessment uses a computable general equilibrium (CGE) model of the California economy called E-DRAM, developed by the University of California, Berkeley. It has been used by the Department of Finance for revenue impacts of tax and other State policies, by the California Energy Commission and ARB to assess impacts of reducing petroleum dependency (AB2076), and by ARB for the Vehicle Climate Change Standards, the State Implementation Plan analysis, and others. As a part of the application of the

model to these analyses, it has been peer reviewed and calibrated to be representative of the California economy.

A CGE model simulates the functioning of a market economy in which different sectors interact with one another (one sector supplies inputs to another, or purchases the outputs of another) and where prices and production adjust in response to changes caused by government policies applied to specific sectors. The CGE simulates these relationships among California producers, California consumers, government, and the rest of the world. Because of the interconnection between sectors, an intervention in one sector has impacts on others, which are captured by the CGE model analysis.

The inner workings of the CGE model can be graphically illustrated. Figure 8-1 shows a simplified version of the sectors that interact and participate in goods, services, and labor flows that make up the economy. The diagram shows that the households sell factors of production (labor and capital) to the firms which use the factors to produce goods and services to sell to the households. It also shows the flow of payments that accompany the transactions between the firms and the households. The diagram includes the flow of transactions between the firms. That is, how the firms buy and sell intermediate goods amongst themselves to produce the final products sold to the households.

Figure 8-1 Circular Flow of Goods and Services in the Economy

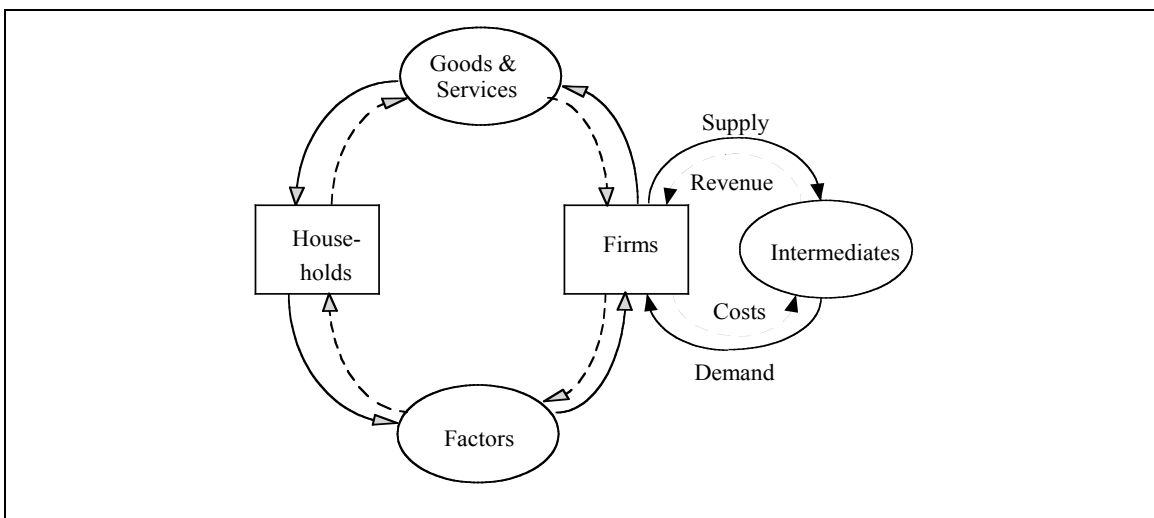
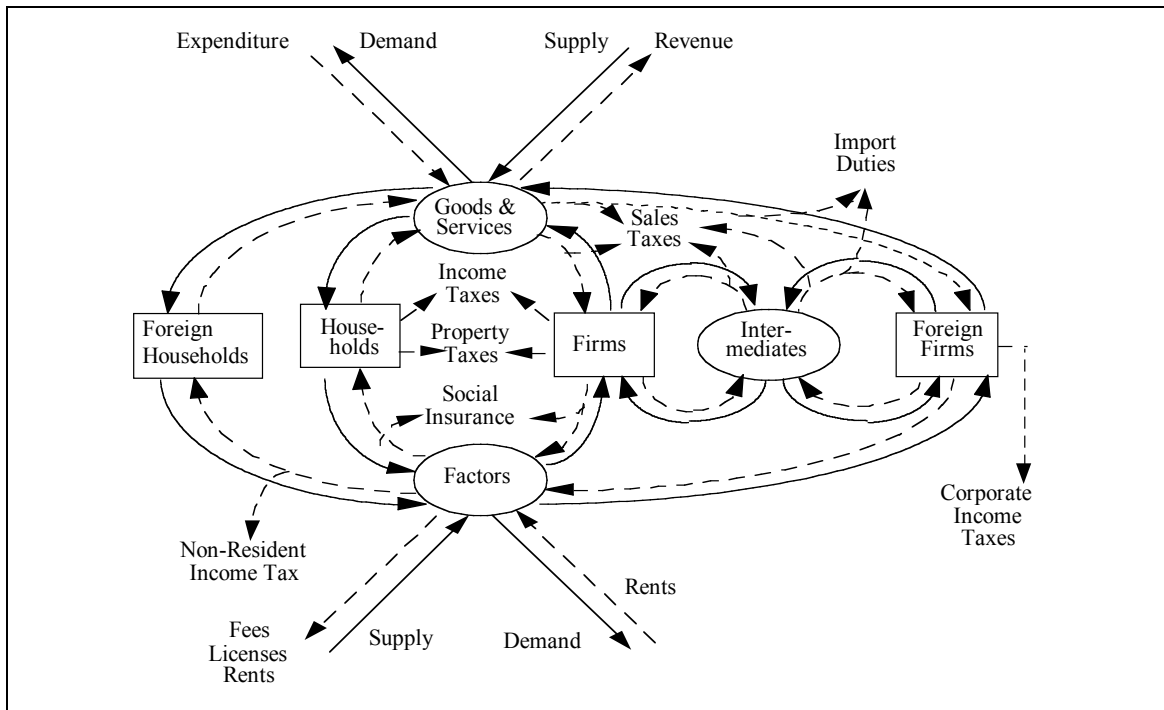


Figure 8-2 shows the complexity of the complete California economy and the many sectors involved in producing goods and services for final consumption by the households inside and outside of California.

Figure 8-2 Complete Circular Flow of Goods and Services in the Economy



The E-DRAM model accounts for all of the flows in the California economy using many equations. When a regulation or a policy is adopted that could affect costs of production in one part or sector of the economy, the rest of the economy has to adjust to the perturbation through price or employment changes. The CGE tracks the changes and produces results that show how much each sector has changed. The main economic indicators are number of jobs and income. It is believed that these two key indicators are particularly informative for characterizing the impact of potential policies on California's economy. Jobs are an important indicator for decision making, and income closely follows the gross state product which is an indicator of overall economic well-being in the state. This economic assessment presents the changes in these two indicators as the net economic impacts of the strategies.

8.2 Analysis of Climate Change Reduction Strategies

The strategies evaluated in this section are taken from Table 5-2 (proposed strategies). The objective of the analysis is to draw on available cost data to provide an overall assessment of the impact of the suite of strategies discussed in Table 5-2 on California's economy. Table 5-1 strategies will be included in the final analysis to be sent to the Governor and the Legislature. The focus of this initial report was Table 5-2 because most of the strategies in Table 5-1 have completed economic assessments which indicate their benefits whereas the strategies in Table 5-2 have not yet been evaluated.

DRAFT for public review – Partial Analysis on Climate Change Emission Reduction Strategies

Inclusion of Table 5-1 strategies in the macroeconomic analysis is anticipated to result in more jobs and more personal income. A summary of information on Table 5-1 strategies and their economic effects is included here. Following that summary the results of the macroeconomic assessment of Table 5-2 strategies is discussed.

Summary of Table 5-1, Strategies Underway

Many of the strategies underway have and/or are expected to result in substantial cost savings for consumers and benefits to the economy as a whole:

- The ARB's economic analysis of the Vehicle Climate Change Standards concluded that by 2010, jobs increase by 3,000 and income by \$170 million, and by 2020, jobs increase by 53,000 and income by \$4.7 billion.
- The Diesel Anti-idling strategy is expected to save \$575 million by reducing diesel consumption, without including the health benefits associated with reduced particulate exposure.
- Strategies such as Investor Owned Utility Energy Efficiency Programs, Achieve 50% Recycling Goal, Building and Appliance Energy Efficiency Programs, and Fuel-Efficient Replacement Tire and Inflation Programs have been evaluated by the implementing state agencies as well as universities and institutes and have been shown to benefit the economy by producing additional jobs and income for California.
- The Green Building Initiative could provide benefits of \$147 million in 2010 and \$614 million in 2020 with very modest assumptions on the energy prices. Based on historical experience, every dollar spent on energy efficiency typically provides about \$2 in benefits.
- The California Public Utilities Commission (CPUC) is currently reviewing a statewide solar incentive program proposal. If, as expected, it is adopted by the CPUC in January 2006, the proposed California Solar Initiative (CSI) will provide close to \$2.9 billion in incentives between 2007 and 2017. The program is anticipated to bring on line or displace 3,000 MW of power. As costs and savings estimates are further developed they will be included in a refined economic impact analysis of the climate change reduction strategies.
- The CPUC commissioned a report entitled "Achieving a 33% Renewable Energy Target" to identify feasibility and next steps to accelerate and expand the current CPUC Renewable Portfolio Standard program. The report determines that after the initial infrastructure costs are borne, the resulting benefits to ratepayers in 2021 and beyond are net positive. Using the CEC's long-term forecast of natural gas prices, the report finds that ratepayers would likely realize a net benefit over a 20 year period.

Once these strategies are added to the analysis, it is anticipated even greater economic benefits will be evidenced by the macroeconomic analysis.

Economic Impacts of Table 5-2, Strategies Needed to Meet California's Targets

The strategies presented in Table 5-2 (proposed strategies) were included in the modeling analysis. Several sources were drawn on to identify preliminary cost information including analyses done by UC Berkeley, and the Tellus Institute. Many of the strategies have implementation costs. However, several strategies also have savings that mitigate or exceed the costs. The estimated costs and savings were entered in the E-DRAM model to assess the impacts on jobs and income.

The net cost for all of the strategies considered in this analysis is about \$600 million in 2010 with savings of \$370 million. The impacts of the costs and savings were assessed first assuming the strategies are fully implemented. The results were compared with estimates of jobs and income assuming business as usual and none of the proposed strategies in effect.

California total employment stood at about 16.84 million for 2005. Economic growth will increase employment to about 17.97 million by 2010 (i.e., an increase of over 1 million jobs from 2005). If the strategies that are needed to meet the climate change emission reduction targets are implemented, employment would stand at 17.98. Although the number of jobs with the strategies increases, it is a relative small increase in the overall economy. California personal income for 2005 is about \$1,300 billion. The income estimates for the 2010 economy without and with the strategies would be \$1,527 and \$1,526 billion. The difference is again small in view of the overall California economy. These results are shown in Table 8-1.

The E-DRAM model was also run for the proposed strategies impacts on the California economy in 2020. The strategy costs totaled \$5,231 million with a savings of \$5,198 million. Total employment in 2020 without the strategies would be 20.70 million, and with the strategies is estimated at 20.71 implying a slight increase in the number of jobs. Income for the year 2020 would be at \$2,128 billion without the strategies and \$2,126 billion, a slight decrease and imperceptible in an economy of more than \$2 trillion. These results are shown in Table 8-2.

Table 8-1 Economic Impacts of the Table 5-2 Strategies in 2010

	Without Strategies	With Strategies	Difference	Percent of Total
Employment (Thousands)	17,970	17,980	10	0.06%
Income (Billions of 2005\$)	1,527	1,526	-1	-0.07%

Table 8-2 Economic Impacts of the Table 5-2 Strategies in 2020

	Without Strategies	With Strategies	Difference	Percent of Total
Employment (Thousands)	20,700	20,710	10	0.05%
Income (Billions of 2005\$)	2,128	2,126	-2	-0.09%

8.3 Summary

Based on a preliminary analysis, it appears that the climate change emission reduction targets can be met without adversely affecting the California economy. Rather, it is likely that when all strategies in Tables 5-1 and 5-2 are implemented, those underway and those needed to meet the Governor's targets, the economy will benefit. The strategies that focus on reduced operating costs and produce net savings can greatly contribute to economic activity while reducing climate change emissions. Further, technology improvements and innovative implementation of strategies currently estimated to have net positive costs may, in practice, switch from net costs to net savings.

Over the next year, as refined cost information for the strategies is developed, a subsequent analysis of the economic impacts will be performed. In addition to characterizing the overall impacts of the strategies on California's economy, the subsequent analysis will include a cost-effectiveness assessment. These analyses may facilitate the identification and inclusion of new cost-effective climate change emission reduction strategies not currently presented in Table 5-2.